Climate and Energy: the Road Ahead for US-China Cooperation

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Beijing, China

October 28 2013

Good afternoon.

When I spoke here previously, it was as a professor from what you might call "the Tsinghua of America," (MIT).

It's good to be back, this time not as a scientist and an academic, but as a leader in government. I suspect that's a transition that awaits many of the students here today, too.

I came to this job, as Secretary of Energy, because I believe the challenges of energy and climate change are the most urgent facing our generation all around the globe.

Of course, there are few countries as important to the prosperity of the global economy and the health of the environment as China and the United States. President Obama has made clear that the

United States sees engagement in Asia as an opportunity to work with our partners on shared interests, to provide constructive leadership, and to increase trade and investment, and to. As my president said:

> *The United States has been, and always will be, a Pacific nation... Here, we see the future.*

Climate and energy lie at the heart of our focus on building stronger partnerships in Asia. Demand for energy has increased dramatically as Asian economies continue to grow, creating many opportunities for economic cooperation, and a clear need for smart growth.

Today, the energy sector serves 5 billion people, represents $6 trillion a year of economic activity – and is a leading contributor to global climate change. We have a moral responsibility to assure that as the world economy continues to develop, we can sustain the prosperity we create, and do not follow a path that leads to an irretrievably damaged planet.

Climate Science

The science is clear: Global climate change is here. It is real, and it is driven by human emissions.

We have known for over one hundred years that certain trace gases in the atmosphere—most importantly water vapor, carbon dioxide, and methane— trap heat and warm the surface of the Earth. In fact, without greenhouse gases in the atmosphere, the Earth's surface temperature would be around zero degrees Fahrenheit, roughly sixty degrees Fahrenheit colder than it is today. That is well below the temperature needed for life as we know it to have evolved on the planet. It does not take much of a shift in this overall greenhouse effect to cause significant changes in the Earth's temperature. The increase in the quantities of greenhouse gases in the atmosphere as a result of human activity, above all the combustion of fossil fuels, has reached the point at which it is profoundly affecting the climate. How much more severe those impacts become going forward depends primarily on how rapidly and effectively the United States, China and other nations move to curtail greenhouse gas emissions.

While many greenhouse gases are produced by human action, carbon dioxide is particularly important because it is both long-lived – it can persist in the atmosphere for up to hundreds of years

— and it is produced in large quantities by the combustion of fossil fuels. Right now, globally, we are putting around 35 billion metric tonnes of CO_2 into the atmosphere each year from fossil fuel combustion and land use change, with the majority coming from fossil fuels.

Given the carbon cycle, the net effect is that the atmosphere retains about half of those emissions, with the rest absorbed by the oceans, forests and vegetation -although those natural sinks may become less efficient as CO_2 atmospheric concentrations rise. The arithmetic is such that without prudent action in the near term, we will approach a doubling of preindustrial carbon dioxide concentrations sometime around midcentury, a level that has been recognized by the scientific community as having major consequences. This means that if we don't start reducing emissions now, there is a very high likelihood that our children and grandchildren will face major climate disruptions.

The recent report by the IPCC estimates that sea levels have already risen a foot over the past century, and will rise as much as three feet in the next hundred years. For cities like Guangzhou and Shenzen, rising seas threaten billions of dollars in damage and millions of people affected each year by flooding.

No single weather event can be attributed to climate change, but we can expect shifts in patterns of drought and rain. For example, warmer tropical waters will feed stronger storms. Events like last month's Typhoon Fitow, which forced the evacuation of a half a million people and caused at least 21 billion yuan in damage, will become more destructive, with faster winds, more rain and higher storm surges.

In the U.S., we have seen coal plants and nuclear plants shut down because the water used to cool them was too hot.

We have seen drought in our farmlands, floods in our mountains and river basins, and unseasonable heat and cold in the northern and southern parts of our country. In China, you've seen extreme weather – like the highest temperatures in Shanghai in 140 years during this July's heatwave, and terrible floods in both northeast and southeast China over the summer. You've seen weather and pollution come together to smother cities with smog so thick it looks like a blizzard, cancels flights and closes schools.

We can't wait any longer to act. We must begin work <u>now</u> if we want to avoid the worst threats of global climate change.

This will be the biggest test of your lifetime. Bigger than the Gaokao – and more important to your future[1]. The good news is that we need not work alone. We can work together, study together, learn together and succeed together. Because we will all pass this test, or we will all fail.

China and the United States must be part of the solution. This is not politics, it's math. China and the U.S. are the world's two largest emitters of CO2, the world's two largest energy consumers, and the world's two largest energy producers. We must therefore be the leaders in addressing climate change.

Today I'll talk a little about what the U.S. is doing domestically, and what we have started to do together.

Climate Action Plan

For the United States, President Obama has set out a climate action plan based on three pillars:

[1] The Gaokao is informal name of the National College Entrance Examination taken by all high school seniors

First, mitigation – reducing our emissions domestically, both through renewable technologies and through efficiency. This will be the focus of my discussion today.

Second, adaptation – preparing our domestic infrastructure for climate change impacts that are already baked in, as the carbon already put into our atmosphere has its effect. We must recognize that impacts from climate change are already here and more are on the way. The Obama Administration is committed to preparing communities in America- and working with our global partners to protect the world's most vulnerable citizens for the more severe storms, droughts, and rising sea levels that we are already seeing.

Third, international cooperation – working with the worldwide community to share and promote the use of renewable energy, energy conservation, and emissions-reducing measures. These efforts are not only focused on bilateral and multinational agreements to take action, but also on sharing information, so that governments and industries ready to act can do so with the best and latest information and best practices.

The U.S. Department of Energy has a critical role to play in driving innovation in the clean energy sector – and ensuring the

efficiency of the energy infrastructure. However, I want to encourage you not to think of these many projects as just U.S.-China projects. Consider making them your projects. If successful, these projects could define the career of an intelligent, ambitious and hard-working young scientist.

Carbon Capture Utilization and Sequestration

The simple fact is that our two countries burn a lot of coal – and in the process, produce a lot of emissions. The coal power and chemicals sectors in the United States and China together consume roughly 60 percent of global coal use each year. By making coal cleaner to burn, we will reap significant benefits for our countries and the world.

Cooperation between the U.S. and China on research, development, and deployment of carbon-capture and utilization technology are therefore enormously important. Sharing information about discoveries and technologies is just as important.

Tsinghua University is an important partner in several research projects already underway through the U.S. - China Clean Energy

Research Center. These projects include studies of coal gasification, catalysts for carbon-capture from post-combustion gases, and studies of geological carbon sequestration in areas like Wyoming and the Ordos Basin.

In just a few weeks, leaders and experts from 23 nations on six continents will convene in Washington D.C. for the Carbon Sequestration Leadership Forum, to support research and development of cost-effective technologies for the separation and capture of CO2, as well as its transport and long-term safe storage. I am delighted to host Vice Minister of Science and Technology Wang Wiezhong for this meeting.

The United States is committed to ensuring fossil fuels are both sustainable and competitive in a clean energy future – which is why we have committed more than $14 billion for advanced fossil energy technologies that reduce carbon pollution and in carbon capture and sequestration technologies.

Unconventional Natural Gas

As you will know, natural gas burns cleaner than other fossil fuels, releasing less carbon for the same amount of energy. In the U.S.

natural gas has played an important role in increasing our energy security, decreasing our oil imports, decreasing our CO2 emissions, and providing a bridge fuel to the clean energy technologies of tomorrow.

Thanks to unconventional natural gas, the United States is again the largest gas producer is the world. The U.S. shale gas revolution comes as the result of years of investment by both the Department of Energy and private companies, to develop the skills and techniques needed to extract this hard-to-reach resource. Cooperation with U.S. industry on commercial terms can benefit both our countries in terms of economic opportunities, energy security, and combating climate change.

China has significant shale gas potential, but many barriers to development remain. The challenges of geology and topography, lack of water and lack of natural gas infrastructure, are familiar to U.S. companies, and many are eager to assist with the technology and skilled personnel necessary to develop these resources. Open markets and clear policies and regulations around mineral rights will be important to establishing cooperation between U.S. and Chinese businesses.

Nuclear

President Obama has also made clear that safe, secure nuclear power will be a part of America's low-carbon energy future. In the U.S., nuclear power accounts for 60 percent of electricity from low-carbon sources.

China and the U.S. continue to collaborate successfully on nuclear safety, environmental issues, emergency management and radiological security as Chinese nuclear plants are built and begin to operate. With 30 new nuclear plants under construction, China's nuclear capacity will more than triple.

The United States remains committed to assuring that nuclear power can be used safely and securely, with international cooperation to manage the fuel cycle and maintain the highest non-proliferation standards.

Solar and Wind

Solar and wind power have matured. These renewable energy sources are no longer five years away – they're a growing part of today's energy supply in the United States.

In 2012, wind was America's largest source of new electrical capacity, accounting for 43 percent of all new installations. Altogether the United States has deployed about 60 gigawatts of wind power -- enough to power 15 million homes. Since 2008, deployment of photovoltaic solar panels has increased by a factor of ten, in part thanks to a 75% decrease in the cost of PV panels.

Solar and wind also illustrate the importance of intergovernmental cooperation. During the late 2000s, global PV installations grew at an annual rate of 50% to 100%.[2]

Investing in U.S. Green Companies

When we work together, we can accomplish a great deal. Many U.S. companies are looking for capital investments to bring green innovations to market. Direct investment from Chinese businesses can help bring these innovations to scale rapidly.

New innovations are often only marketable when economies of scale help make the price affordable and sustainable. Too often, inability to achieve that scale prevents new clean technologies

[2] http://mitei.mit.edu/system/files/201305-futureofsolar-SunDuel.pdf

from ever being deployed. Partnering American innovation with the scale of the Chinese market can help bridge the gap between innovation and profitable production.

Efficiency

Of course, the lowest-carbon energy is the energy that you don't have to produce at all. Saving energy reduces carbon produced, reduces demand on infrastructure, and saves consumers money.

For example, the Department of Energy recently issued new efficiency standards for walk-in and commercial freezers. The new standards will save up to $28 billion in electricity costs, and cut emissions by over 350 million metric tons of CO2 over 30 years. This reduction in CO2 emissions would be the equivalent of taking nearly 109 million new cars of the road for one year.

Through the U.S.-China Clean Energy Research Center, the U.S. and China are working on efficiency projects that will make buildings less expensive to heat and cool, and will make cars and electric car batteries lighter and more efficient. Again, Tsinghua University is an important partner on these projects.

Conclusion

No nation is immune to the threat of climate change, and no single nation can prevent it. The U.S. Department of Energy is working with a broad spectrum of partners in bilateral and multilateral collaborations on every front. The United States and China can be – and must be – important partners in addressing climate change.

As Tsinghua University graduates, you can be a part of this effort. You can apply your "self-discipline and social commitment" to protecting the world against this threat[3].

We will need the scientists to study solutions, the engineers to build them, the industrialists to manufacture them, and the diplomats and statesmen to bring the world together to address this challenge.

We each have our piece to contribute. I hope that I can count on you to do your part. I hope that when your hair is as grey as mine, you can stand before the brightest minds in the next generation and say – we did our best, we matched words with actions, and now it's up to you.

[3] Tsinghua's motto

Thank you.